

**NUMBER NINE WIND FARM
MDEP NRPA/SITE LOCATION OF DEVELOPMENT COMBINED APPLICATION**

Section 28.
Tangible Benefits

SECTION 28. TANGIBLE BENEFITS

28.1 INTRODUCTION

Tangible benefits are defined as environmental or economic improvements or benefits to residents of the state attributable to the construction, operation, and maintenance of a wind energy project (35-A MRSA §3451(10)) and include, but are not limited to, the following:

- Property tax payments resulting from the development;
- Other payments to a host community, including, but not limited to, payments under a community benefits agreement;
- Construction-related employment;
- Local purchase of materials;
- Employment in operations and maintenance;
- Reduced property taxes;
- Reduced electrical rates;
- Land or natural resource conservation;
- Performance of construction, operations, and maintenance activities by trained, qualified and licensed workers; or
- Other comparable benefits.

There is no statutory requirement that wind energy projects provide benefits in each of the areas noted above, but rather that the collective benefits from such projects are significant (38 MRSA §484(10)(C) & 35-A MRSA §3454).

In this respect, the tangible benefit statute in the Maine Wind Energy Act sets forth 5 documentation categories a permit application must address, which are (1) the estimated jobs to be created state-wide and in the host community or communities; (2) the estimated annual generation of wind energy; (3) the projected tax payments; (4) a description of the community benefits package, including but not limited to community benefit agreement payments¹; and (5) any other tangible benefits to be provided by the project.

¹ The tangible benefits statute specifically contemplates that an applicant may satisfy this documentation category by submitting an addendum to the permit application during the period when the application is pending (35-A MRSA §3454(1)).

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28.2 SUMMARY OF SIGNIFICANT TANGIBLE BENEFITS PROVIDED BY NUMBER NINE WIND FARM

As summarized in the table below, Number Nine Wind Farm LLC (Applicant) plans to develop the Number Nine Wind Farm (Project) so that the Project provides significant tangible benefits to local communities and Aroostook County, as well as throughout the State of Maine.

Table 28-1 – Summary of Number Nine Wind Farm Tangible Benefits

Benefit	Estimated Value
Approximate total capital investment	\$606 million
Estimated full-time and part-time jobs to be created state-wide for Project development and construction	653 state-wide jobs
Estimated labor income from state-wide Project development and construction jobs	\$107.8 million
Estimated full-time and part-time jobs to be created in Aroostook County for Project development and construction	324 Aroostook County jobs
Estimated labor income from Aroostook County Project development and construction jobs	\$39.7 million
Cumulative Community Benefits, equivalent to at least \$4,000 per turbine, per year	At least \$9.52 million
Residential heating improvement program for Aroostook County	At least \$2 million
Estimated property tax payments on a yearly basis	\$2.4 million (annually)
Estimated annual energy production, enough to power 68,000 average homes per year	Approximately 800,000 – 900,000 MW hours per year
Estimated annual lease payments to landowners	Between \$1 million and \$2 million per year
Approximate tonnage of CO2 avoided annually	487,000 tons

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Further detail and context on significant tangible benefits provided by the Project are described in the following sections.

28.3 ECONOMIC BENEFITS

28.3.1 General Economic Benefits of Wind Energy Projects

The economic benefits of wind energy development in Maine are well-established. Recent studies demonstrate the positive economic impact of existing wind energy in Maine, as well as projected positive impacts.

For example, in a study performed by the Maine Center for Business and Economic Research of the University of Southern Maine, more than \$222 million in expenditures occurred in Maine for 3 previously developed wind energy projects, resulting in an average of 250 new jobs created annually for 7 continuous years (Exhibit 28-A)².

Further, in a report commissioned by the Maine Public Utilities Commission (MPUC) and prepared by London Economics International LLC, projected economic impacts of 625 MW of installed capacity included (i) a \$1.14 billion increase in Maine's Gross State Product; (ii) \$560 million of investment in Maine; (iii) 11,700 new jobs (temporary or permanent); (iv) annual tax revenue of \$6.3 million; (v) annual savings to Maine ratepayers of \$4.5 million from reduced electricity rates; and (vi) \$13 million in annual emissions reductions³.

These studies show Maine's past experience with wind projects has had a significant positive economic impact, which is projected to continue with further development of this resource.

28.3.2 Investment, Economic Output, Job Creation, and Additional Tax Revenue for Aroostook County and the State of Maine

As detailed in Section 3 of this application (Financial Capacity), the estimated capital investment resulting from the Project is approximately \$606 million. This new investment will spur numerous additional economic benefits to the local and state economies, from new jobs to a broadened tax base with new tax revenue. These additional economic benefits are described below.

To analyze the Project's economic benefits, Todd Gabe, Ph.D., one of the leading economists in the State of Maine, prepared a Project-specific study (Exhibit 28-B) on the local and state economic impacts of the Project (the "Number Nine Wind Farm Economic Study").

² Exhibit 28-A. The Employment Impacts of Wind Power Development in Maine 2003-2010, Maine Center for Business and Economic Research University of Southern Maine, Charles S. Colgan, Ph.D. (Feb. 2011).

³ MPUC RPS Report 2011 – Review of RPS Requirements and Compliance in Maine, prepared by London Economics International LLC for the Maine Public Utilities Commission, at p. 19 (Jan. 30, 2012).

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The Number Nine Wind Farm Economic Study examined the economic impact of developing, constructing, and operating the Project, and made the following conclusions:

- The Project will generate a total estimated economic output of \$356.4 million for the entire state due to Project development and construction.
- An average of 653 state-wide full-time and part-time jobs will be created, totaling \$107.8 million in labor income due to development and construction of the Project.
- In Aroostook County, the estimated economic output is \$114.8 million due to Project development and construction.
- In Aroostook County, an average of 324 full-time and part-time jobs will be created, totaling \$39.7 million in labor income.
- Once constructed, the permanent state-wide economic output due to annual operations is estimated at \$4.1 million, with 29 full-time and part-time jobs and \$1.5 million in labor income.
- In Aroostook County, once constructed the economic output due to annual operations is estimated at \$1.9 million, with 16 full and part time jobs and \$800,000 in labor income.
- Economic activity generated by the Project is estimated at \$12.6 million in state and local tax benefit during Project development and construction, and \$2.4 million annually from Project operations once constructed.

28.3.3 Community Benefits Package

The tangible benefit statute requires a community benefits package that is valued at no less than \$4,000 per turbine per year (averaged over 20 years) to a host community or communities (35-A MRSA §3545(2)).

The Applicant is currently negotiating a community benefit agreement with the Aroostook County Commissioners, which is intended to be part of a comprehensive community benefit package for Aroostook County (including local communities proximate to generating facilities of the Project). In this respect, the Aroostook County Commissioners have passed a resolution stating their intent to accept community benefit funds that are at least \$4,000 or more per turbine per year in value. A copy of this resolution, dated January 21, 2015, is attached as Exhibit 28-C. The final community benefit package, which is expected to exceed the \$4,000 per turbine per year value requirement, is under discussion and will be submitted to the Department once available.

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Additionally, the Applicant is finalizing an arrangement, anticipated to be administered by Efficiency Maine, to provide up to \$2,000,000 in financial assistance to residents of Aroostook County to reduce heating costs through deployment of energy efficiency measures and highly efficient heating systems. A more detailed description of this program is attached as Exhibit 28-D.

Thus, the proposed community benefit agreement with Aroostook County will exceed the minimum statutory requirement for a community benefits package.

28.3.4 Landowner Income

The Project is located in an area of Aroostook County that has a strong tradition of utilizing natural resources as part of a working, multiple use forest (e.g., production of forest products). The Project will continue that tradition of utilizing natural resources (i.e., wind resource) in a manner that complements these traditional uses.

Local landowners participate in the Project either through land leases, fee acquisitions, easements, or similar instruments. This additional income from the Project serves as a predictable income source that acts as a “multiplier” for economic activity in Aroostook County. Further, as noted above, it allows landowners to continue capturing economic benefits from existing land uses without interruption. Forest management, including forest product harvests and utilization, as well as other traditional uses, will be able to continue with the Project providing supplemental income for landowners in addition to traditional sources.

28.3.5 Property Taxes

The Project represents one of the largest investments ever in Aroostook County (and the State of Maine). It will add significant new property tax revenue and broaden the tax base in the Unorganized Territory and municipalities in which the Project is located. When tax revenue and the tax base is broadened in this manner, the typical effect is a reduction in taxes overall (e.g., reduced tax rates). This is particularly true for wind energy developments such as the Project, since it does not create incremental demand in governmental services commensurate with its level of investment that would otherwise increase governmental costs. The result is a net tax benefit for Aroostook County (in both the Unorganized Territory and organized municipalities in which the Project is located), as well as the State of Maine.

The Applicant estimates the Project will contribute average annualized property tax revenue totaling approximately \$2.4 million.⁴ These tax payments will provide an opportunity for Aroostook County and municipalities to lessen the burden on other taxpayers in each respective

⁴ Adjustments to the average annualized property tax revenue may occur in the event a credit enhancement agreement is executed in conjunction with any tax increment financing districts and associated development programs.

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jurisdiction due to additional tax revenue and the minimal need for governmental services that the Project may require.

28.3.6 Ratepayer Benefits

It is anticipated that the Project will indirectly benefit all classes of electrical ratepayers in Aroostook County (currently administered by the Northern Maine Independent System Administrator or "NMISA"), the State of Maine, and New England. As discussed below, the tangible benefit to ratepayers on the NMISA system is in the construction of a 345 kV generator lead line that provides new infrastructure which has the potential to provide access for ratepayers in northern Maine to larger and more competitive electricity markets as well as the potential to provide greater electrical system reliability. The tangible benefit to ratepayers on the ISO-NE grid in Maine will be the supply price suppression effect of power being delivered to that system by a wind generation unit that will be bidding into the ISO-NE wholesale electricity markets with no fuel cost. The Project will also provide additional fuel diversity on the ISO-NE system that has become increasingly natural gas dependent.

To elaborate on the benefits to the majority of the Maine ratepayers who are served by the ISO-NE administered system, the addition of new wind power generation facilities helps to diversify Maine's and New England's power generation sources, which tends to lower and produce less volatile electricity rates, especially in the case of renewable sources of power generation such as wind, which is less subject to volatile pricing due to its zero fuel cost. This means generally that when resources like wind that have no fuel cost displace conventional generation in sufficient capacity, the wholesale and retail market prices for electricity, which are primarily driven by fossil fuel pricing, are expected to respond with lower energy costs.⁵ The addition of the Project helps further this benefit to all classes of ratepayers.

The Applicant will be constructing 2 sections of a 345 kV generator lead in the corridor south from the Turbine Area to interconnect with the ISO-NE administered grid. A segment of this

⁵ The ratepayer benefits of renewable energy has been previously recognized by the MPUC, stating,

The addition of diverse (non-gas) resources in Maine and elsewhere in the region will be beneficial for several reasons. As more non-gas generation is added to the mix, cheaper gas resources and non-gas resources will set clearing prices in a greater number of hours. This would have the general effect of reducing both the level and volatility of electricity prices through the region. To the extent new generation is constructed within Maine's borders, the benefit to Maine consumers is more direct in that the result would be lower prices within the Maine zone. In addition, any overall reduction in the demand for gas that results from the addition of non-gas resources in the region should have the effect of reducing the price of natural gas which translates to lower electricity prices. Finally, a reduction in the region's reliance on natural gas would result in a more secure system that is less vulnerable to gas shortages and thus less susceptible to curtailments and blackouts.

See MPUC Review Comments for Land Use Regulation Commission, Zoning Petition ZP 702, Maine Mountain Power, LLC, at p. 4 (April 14, 2006).

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generator lead line is located in a transmission development corridor historically known as the “Bridal Path” corridor, the development rights to which are owned by Emera Maine, a Maine Transmission and Distribution utility. As described in Section 1, it is anticipated that an electric utility will acquire the Bridal Path Line, upgrade it and use it for a different purpose, namely to interconnect the northern Maine electrical system to the north and improve the reliability of the northern Maine grid system. The potential use of the Project infrastructure in this way will also enable renewable and other power generation in northern Maine to have direct access to energy markets served by the ISO-NE administered system to the south.

28.4 ENVIRONMENTAL BENEFITS OF NUMBER NINE WIND FARM AND ENERGY GENERATION

Wind energy does not require fossil fuel combustion and attendant emissions, which produces positive, and sustainable, overall environmental benefits. Specifically, wind energy generation does not produce air or water pollution, and displaces generation from other sources that rely on non-renewable fuels and do result in air and water pollution. These environmental benefits are expressly recognized by the Maine Legislature, as provided in the Wind Energy Act (35-A MRSA §3402(1)), which states,

1. Contribution of wind energy development. The Legislature finds and declares that the wind energy resources of the State constitute a valuable indigenous and renewable energy resource and that wind energy development, which is unique in its benefits to and impacts on the natural environment, makes a significant contribution to the general welfare of the citizens of the State for the following reasons:

A. Wind energy is an economically feasible, large-scale energy resource that does not rely on fossil fuel combustion or nuclear fission, thereby displacing electrical energy provided by these other sources and avoiding air pollution, waste disposal problems and hazards to human health from emissions, waste and by-products; consequently, wind energy development may address energy needs while making a significant contribution to achievement of the State's renewable energy and greenhouse gas reduction objectives, including those in Title 38, section 576;

B. At present and increasingly in the future with anticipated technological advances that promise to increase the number of places in the State where grid-scale wind energy development is economically viable, and changes in the electrical power market that favor clean power sources, wind energy may be used to displace electrical power that is generated from fossil fuel combustion and thus reduce our citizens' dependence on imported oil and natural gas and improve environmental quality and state and regional energy security; and

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C. Renewable energy resources within the State and in the Gulf of Maine have the potential, over time, to provide enough energy for the State's homeowners and businesses to reduce their use of oil and liquid petroleum-fueled heating systems by transition to alternative, renewable energy-based heating systems and to reduce their use of petroleum-fueled motor vehicles by transition to electric-powered motor vehicles. Electrification of heating and transportation has potential to increase the State's energy independence, to help stabilize total residential and commercial energy bills and to reduce greenhouse gas emissions.

Overall, the Project is estimated to provide an approximate average output of 800,000 to 900,000 MW hours per year.⁶ This results in enough power generation to supply approximately 68,000 average homes on an annual basis. The Project will avoid an estimated 487,000 tons of carbon dioxide emissions – the equivalent of removing 101,000 cars from the road each year.⁷

28.5 ADDITIONAL TANGIBLE BENEFITS

The Applicant has a community outreach program that provides direct support to local needs. This support includes charitable giving, sponsorship of community-based events, educational and job training support, and active participation in local schools.

These sponsorships and contributions include:

- Ark Animal Sanctuary
- Aroostook Aspirations Initiative for Heidi's Hope
- Bridgewater Fire Department Tractor Pull
- CanAm antique snowmobile parade
- Central Aroostook Snowmobile Club cookout
- Crown of Maine Balloon Festival
- Houlton Agricultural Fair "Bacon Day"
- Houlton Humane Society
- Mars Hill Rotary Golf Tournament
- Maine Winter Sports Center
- Northern Maine Community College
- Potato Blossom Festival
- Town of Monticello (donation for town office rental)
- Town of Bridgewater (donation for town office rental)
- Snowbird Trails

⁶ This estimated annual production includes the following factors: turbine capacities and efficiencies, wind resource, and curtailment as specified in Section 7 of this application (note: the Applicant does not anticipate any curtailment imposed by a grid operator).

⁷ Estimate based on eGRID data and carbon equivalency conversions provided by the Environmental Protection Agency (EPA). <http://www.epa.gov/greenpower/pubs/calculator.htm>. Accessed March 2015.

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28.6 TANGIBLE BENEFITS REPORTING

The Applicant has developed the following tangible benefit reporting schedule:

Event	Report Deadline and Information
<i>December 31 following commencement of commercial operation</i> End of Year 1	By March 1 (following end of Year 1), the Applicant will report tangible benefits realized from construction and provide documentation of the Project's community benefits package,
End of Year 3	By March 1 (following end of Year 3), the Applicant will report tangible benefits realized from operation and maintenance, and provide documentation of the Project's community benefits package.
End of Year 5	By March 1 (following end of Year 5), the Applicant will report tangible benefits realized from operation and maintenance, and provide documentation of the Project's community benefits package.
End of Year 7	By March 1 (following end of Year 7), the Applicant will report tangible benefits realized from operation and maintenance, and provide documentation of the Project's community benefits package.
End of Year 9	By March 1 (following end of Year 9), the Applicant will report tangible benefits realized from operation and maintenance, and provide documentation of the Project's community benefits package.
End of Year 11	By March 1 (following end of Year 11), the Applicant will report tangible benefits realized from operation and maintenance, and provide documentation of the Project's community benefits package.
End of Year 13	By March 1 (following end of Year 13), the Applicant will report tangible benefits realized from operation and maintenance, and provide documentation of the Project's community benefits package.
End of Year 15	By March 1 (following end of Year 15), the Applicant will report tangible benefits realized from operation and maintenance, and provide documentation of the Project's community benefits package.
End of Year 17	By March 1 (following end of Year 17), the Applicant will report tangible benefits realized from operation and maintenance, and provide documentation of the Project's community benefits package.
End of Year 19	By March 1 (following end of Year 19), the Applicant will report tangible benefits realized from operation and maintenance, and provide documentation of the Project's community benefits package.
End of Year 21	By March 1 (following end of Year 21), the Applicant will report tangible benefits realized from operation and maintenance, and provide documentation of the Project's community benefits package (thereby reporting on tangible benefits received within a 20-year period).

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28.7 CONCLUSION

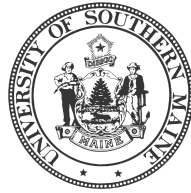
The positive impact of the Project is one of the largest investments in Aroostook County (and the State of Maine), creating new employment, substantial purchases of goods, service, and materials, direct financial benefit to host communities in the form of a community benefit package and taxes, and substantial environmental benefits, which all collectively constitute a significant tangible benefit to Aroostook County and the State of Maine. These economic and environmental benefits attributable to the Project therefore satisfy the significant tangible benefit standard set forth in 38 MRSA §484(10)(C) & 35-A MRSA §3454.

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**EXHIBIT 28-A EMPLOYMENT IMPACTS OF WIND POWER IN
MAINE**

Economic Impacts of Wind Energy
Construction and Operations in Maine
2006-2018



Charles S. Colgan PhD
Maine Center for Business & Economic Research
University of Southern Maine
December 2014

Executive Summary

From 2006 to 2014, fourteen utility scale wind energy projects have been constructed or are currently under construction in Maine. The facilities are being built in nine counties with a total rated generating capacity of 614 megawatts. Projects planned for construction from 2015 to 2018 will add an additional 690 megawatts of capacity, bringing Maine's total current and planned wind generation capacity to 1.3 gigawatts.

Investment in Maine

Based on information provided by the companies that are leading the construction of the vast majority of this new wind energy generation, over \$532.5 million has been spent in Maine on projects from 2006 to 2014. An additional \$745.1 million anticipated over the next four years will bring the total spending in Maine on wind power to \$1.28 billion by 2018. These figures do not include the costs of turbines, blades, and electrical gear bought from outside Maine.

Job Creation

These investments created or supported an average of 1,560 jobs per year from 2006-2018, with the largest employment anticipated in 2015 at over 4,200 jobs. While wind energy projects affect employment in all Maine counties (except York), the vast majority of these jobs are in rural areas of western, eastern, and northern Maine.

Employee Earnings

The jobs, including employment both directly and indirectly related to wind projects, will result in an increase in \$1.14 billion in employee earnings over 2006-2018. The peak year for earnings will be \$256 million in 2015. Earnings include both salaries and benefits. These figures mean that the majority of in-Maine expenditures on wind energy development goes to employee compensation.

Ongoing Employment

Once complete, wind energy projects can employ between 1 and 15 people on site for operations and maintenance. These employees, with the indirect effects, will account for an estimated 160 jobs from 2018 on. Periodic replacement and repair of turbines and towers will require employment levels comparable to the construction phase, which could result in 185-550 employees per year depending on the level of overhaul activity.

New Markets

The large amount of wind energy development in Maine has led a number of companies to begin development markets for their services to wind power projects outside of Maine. A survey of firms supporting wind energy development in and outside Maine found that 23 firms had \$89.6 million in sales over 2011-2013, resulting in an average of 390 employees in Maine over this period and \$61.3 million in earnings.

1. Introduction

The development of wind energy generation has become a significant industry in Maine over the past decade. Since the first utility scale¹ wind project at Mars Hill in Aroostook County went into operation in 2006, Maine has steadily been adding wind generation capacity. Fourteen projects are either operating or scheduled for completion in early 2015, and another four projects are set to begin construction from 2015 to 2018. When completed, these projects will have an installed capacity of 1304 megawatts (1.34 gigawatts), larger than any other single electric generating facility in Maine.

Region	County	Project	Rated Capacity (MW)	Construction Start Year	Operations Start Year
Aroostook	Aroostook	Mars Hill	42.0	2006	2007
Mid Coast	Waldo	Beaver Ridge	4.5	2007	2008
Eastern	Washington	Stetson	83.0	2008	2010
Mid Coast	Knox	Vinalhaven	4.5	2008	2009
Western	Franklin	Kibby	132.0	2008	2009
Eastern	Penobscot	Rollins	60.0	2010	2011
Eastern	Hancock	Bull Hill	34.0	2011	2012
Western	Oxford	Record Hill	50.0	2011	2012
Western	Oxford	Spruce Mountain	20.0	2011	2011
Western	Franklin	Saddleback	34.0	2014	2015
Aroostook	Aroostook	Oakfield	150.0	2014	2015
Eastern	Hancock	Hancock	51.0	2015	2016
Eastern	Penobscot	Passadumkeag	42.0	2015	2016
Kennebec	Somerset	Bingham	186.0	2015	2016
Western	Oxford	Canton	23.0	2015	2016
Aroostook	Aroostook	Number Nine	250.0	2015	2017
Eastern	Washington & Penobscot	Bowers	48.0	2016	2017
Eastern	Washington	Downeast	90.0	2016	2018
Total Capacity Completed or Begun 2006-2014			614.0		
Total Capacity Completed or Begun 2015-2018			690.0		
Total 2006-2018			1304.0		

Table 1 - Wind Energy Projects Included in the Analysis

Together, the construction of these projects will total \$1.277 billion in spending in Maine over 12 years. This amount includes the development and permitting costs plus the costs of construction and turbine installation, which is carried out by Maine-based companies. Because the construction of wind generation projects is often in remote areas, it also includes the costs of food and lodging for the specialized workers required at each site. The figure does not include the costs of turbines, switching and transformer equipment that is needed to complete the projects; these are manufactured outside Maine and brought to each site. The report also examines the impacts of the operating period employment in each of the regions and the impacts of growing sales by Maine companies to contribute to wind energy development outside Maine.

¹ Utility level projects are designed to sell electricity into the wholesale market for electricity in New England or to sell directly into retail markets. They are distinguished from individual projects which provide electricity to designated users.

In addition to analyzing the construction of wind projects in Maine, the report also examines the economic impacts in Maine of the activities of Maine companies who assist in the development of projects outside Maine, both in the U.S. and internationally. The large amount of wind power development in Maine has provided companies the opportunity to develop substantial experience and expertise in the field, which is now being tapped by developers outside Maine.

This report examines the employment and earnings impacts of the development and operation of current and planned projects. The analysis is based on actual expenditure data provided by the two principal firms constructing wind power projects in Maine, Reed & Reed and Cianbro. This data was examined using models of regional economies in Maine developed by Regional Economic Models Inc. (REMI) of Amherst, MA, and maintained at the Maine Center for Business & Economic Research at the University of Southern Maine. The regions analyzed are single or multi-county regions:

- **Aroostook**
- **Cumberland**
- **Western:** Androscoggin-Franklin-Oxford
- **Eastern:** Penobscot-Piscataquis-Hancock-Washington
- **Kennebec Valley:** Kennebec-Somerset
- **Midcoast:** Sagadahoc-Lincoln-Knox-Waldo

2. Wind Power Projects in Maine

A. Expenditures in Maine

Table 2 summarizes expenditures on wind energy construction from 2006 to 2018. Projects through 2014 represent either completed or underway construction. Projects from 2015 to 2018 include the completion of some projects begun in 2014 and projects that will begin in 2015 to 2017. Future projects are in various stage of development including planning, permitting, and the securing of power purchase agreements with utilities.

2006	2007	2008	2009	2010	2011	2012
\$5.94	\$0.51	\$76.65	\$69.01	\$62.74	\$51.69	\$24.59
2013	2014	2015	2016	2017	2018	Total
\$22.78	\$218.57	\$271.79	\$143.35	\$254.97	\$75.04	\$1,277.62

Table 2 - Total expenditures on wind power developments in Maine by year in Millions of Dollars

Over this entire period, wind power investments will total \$1.28 billion. From 2006 to 2014 the total expenditure for projects completed or begun before the end of 2014 was \$532.5 million, which accounts for 614 MW. Projects planned to begin in 2015 or later will result in an estimated \$745.1 million in investment for an additional 690 MW. The largest project in Maine designated Number Nine (at 250 MW capacity), is planned for 2016-2017 in Aroostook County.

Figure 1 shows the distribution of expenditures by region. Over the entire period, the Eastern region receives the most investment, followed by Aroostook County (on the assumption that the Number Nine project is built as planned). The Kennebec Valley and Western regions receive about the same amount of investment.

B. Employment Impacts

Table 3 shows the number of jobs estimated to have been created or supported in each region as a result of the expenditures in Table 2. Over the entire period, the wind projects increased employment in Maine by an average of 1,566 jobs per year. Projects through 2014 increased employment by an average of 1,037 jobs per year, which will increase to an average of 2,756 jobs from 2015-2018. The peak year for employment is expected to be 2015, when over 4,200 jobs will be created connected to wind energy development in Maine. The Bingham project in Somerset County will make the Kennebec Valley region the peak employment of all regions at years with over 2,200 jobs.

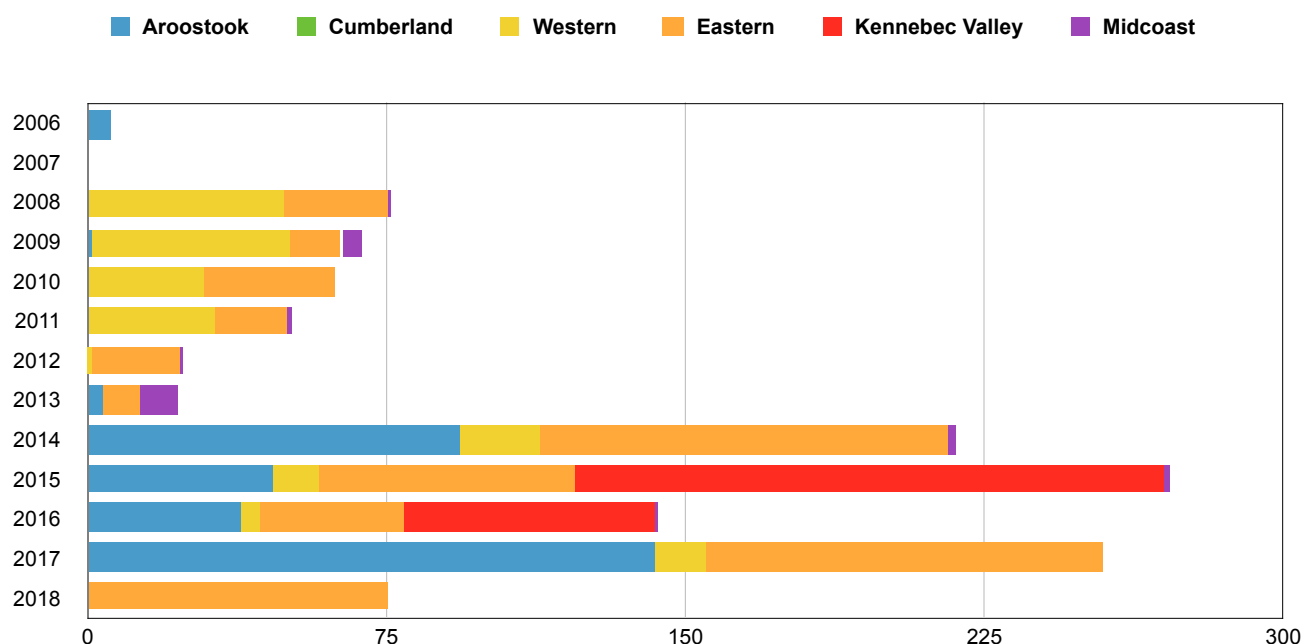


Figure 1 - Wind Development Expenditures by Region and Year

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Aroostook	139	10	3	17	8	-	-	55	1,441	693	552	1,988	-
Cumberland	-	-	46	52	37	37	16	16	16	65	49	36	58
Western	-	-	946	942	521	538	-	-	262	153	31	133	-
Eastern	2	1	536	264	539	321	358	85	1,640	1,022	523	1,413	973
Kennebec Valley	-	-	24	26	20	18	8	8	26	2,222	934	19	-
Midcoast	-	-	32	113	13	22	20	117	39	79	48	24	10
TOTAL	141	11	1587	1414	1138	936	402	281	3,424	4,234	2,137	3,613	1,041

Table 3 - Employment Impacts By Region

Not surprisingly, the construction industry is the largest industry affected by the projects, with about 54% of the jobs estimated. If the construction industry is used to approximate those jobs directly tied to the wind energy development, then the multiplier of the jobs is 1.85. On average across all years the construction industry employed 840 jobs per year, with indirect jobs of 740 per year. From 2014 on the construction industry will average over 1400 jobs per year, which will be about 6% of all construction jobs in Maine.

With large-scale construction projects, the jobs created are in one sense temporary, lasting the duration of each project. But the large and growing amount of wind energy investments means that many of the jobs have become effectively permanent, with a significant workforce at companies like Reed & Reed and Cianbro moving from project to project. Jobs in other industries, such as restaurants, hotels, and engineering are best described as “supported by” the wind projects. These are not necessarily new jobs, but a portion of each job’s income earned in a given year derives from the wind development expenditures.

	Avg 06-14	Avg 15-18	Avg 06-18	Share of State 06-14	Share of State 15-18	Share of State 06-18
Aroostook	186	808	377	17.9%	29.3%	24.1%
Cumberland	24	52	33	2.4%	1.9%	2.1%
Western	357	79	271	34.4%	2.9%	17.3%
Eastern	416	983	591	40.1%	35.7%	37.7%
Kennebec Valley	14	794	254	1.4%	28.8%	16.2%
Midcoast	40	40	40	3.8%	1.5%	2.5%
Maine	1,037	2,756	1,566			

Table 4 - Employment Impacts by Region

Table 4 and Figure 2 track the employment impacts by region. Beginning in Aroostook County with Mars Hill in 2006, development employment shifted primarily to the western region from 2008-2011, and then shifted to the eastern region from 2012 on. Through the period analyzed, the eastern region accounts for the bulk of employment with 38%. Large projects under way and planned for the Kennebec Valley and Aroostook regions will bolster employment there in the next several years, but the eastern region will continue to dominate in employment.

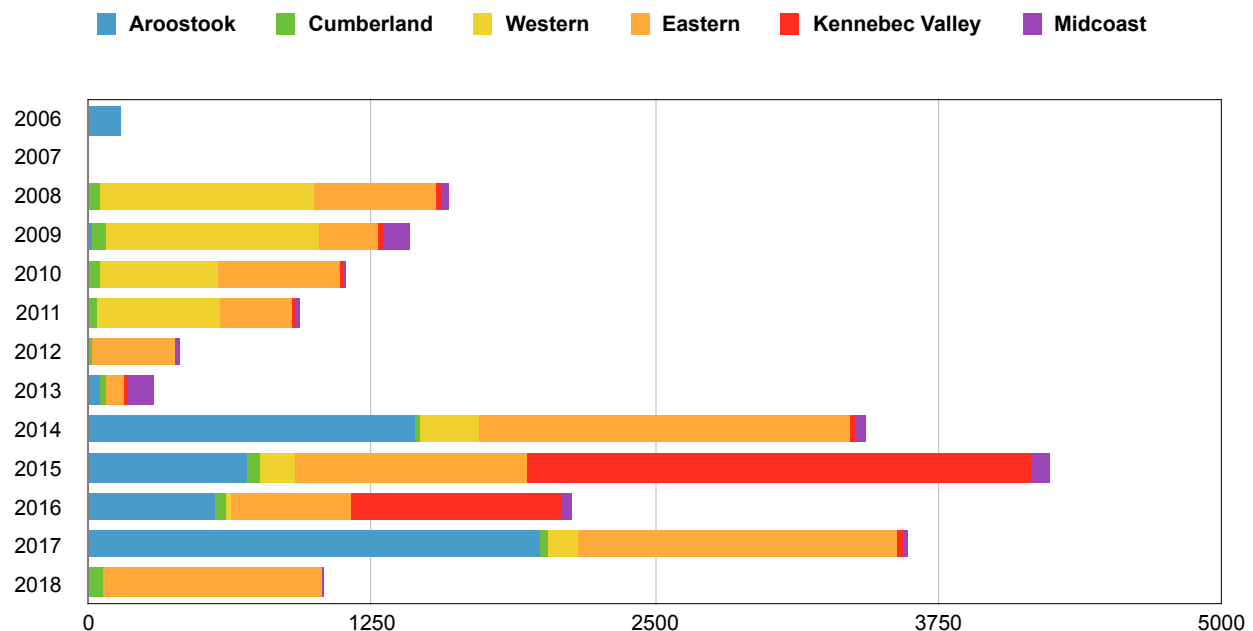


Figure 2 - Estimated Employment Impacts

While the dominant employment impacts are in the regions where the wind energy projects are located, there are employment effects in most of Maine, including Cumberland County, which sees employment gains from the various services that are provided to the wind energy there. York County is the only county in Maine without significant economic impact from wind energy development.

These employment estimates should be considered conservative. That is, they are probably somewhat lower than actual employment effects. This is because the evolution of the wind energy and supporting industries in Maine is continuing throughout the period, with more of the supporting inputs coming from Maine sources. This evolution is not fully captured in the data sets used for analysis because of lags in data reporting.

C. Earnings Impacts

Over 2006-2018, employee earnings increase in Maine by a total \$1.137 billion. Projects through 2014 added \$453.0 million, and it is anticipated that earnings will increase by a total of \$687 million from 2015-2018. 2015 is expected to be the peak year for earnings gains with \$256 million added to the economy.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Aroostook	\$5	\$1	\$0	\$1	\$0	\$0	\$0	\$2	\$63	\$36	\$31	\$102	\$8
Cumberland	\$0	\$0	\$3	\$3	\$2	\$3	\$1	\$1	\$1	\$4	\$3	\$2	\$4
Western	\$0	\$0	\$39	\$41	\$26	\$27	\$3	\$0	\$14	\$10	\$3	\$8	-\$2
Eastern	\$0	\$0	\$22	\$13	\$27	\$17	\$19	\$7	\$86	\$60	\$36	\$87	\$66
Kennebec Valley	\$0	\$0	\$1	\$1	\$1	\$1	\$1	\$1	\$2	\$140	\$67	\$8	\$3
Midcoast	\$0	\$0	\$1	\$5	\$1	\$1	\$1	\$7	\$2	\$5	\$3	\$2	\$1
Total	\$5	\$1	\$66	\$64	\$57	\$49	\$25	\$18	\$168	\$255	\$143	\$209	\$80

Table 5 - Increases in employee compensation from wind energy development (in Millions)

In this analysis, “earnings” includes wages and salaries paid, employee benefits such as health insurance, and the employer share of social security taxes. It does not include proprietors income, which is the income earned by businesses other than corporations.

The dollar amounts in this table are in constant 2005 dollars because the analysis does not include inflation, so the precise value of, for example, the \$168.00 million in earnings in 2014 expressed in 2005 dollars in Table 5 is not estimated. As a rough guide, however, the Consumer Price Index can be used to “inflate” the 2005 dollars to 2014 levels. In this case the earnings estimated for 2014 would be \$204.24 million in today’s dollars.

D. Operating Period Employment

Once generating power, employment at wind power projects can be divided into two parts. First, each site requires at least one person to perform daily checks of equipment and perform routine maintenance on the site and the equipment. The number of people employed for these purposes varies by site and the number of turbines operating. In estimating operations employment, a rough guideline of 1 employee per 20 megawatts of installed capacity, with the condition that this will not fall below 1 employee. These assumptions yield the figures in Table 6. The analysis of the total employment estimates results in Table 7 and Figure 3 (following page).

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Aroostook	3	3	3	3	3	3	3	3	3	13	13	13	29
Western	0	0	0	0	9	10	13	13	13	16	17	17	17
Eastern	0	0	0	0	6	10	12	12	15	18	27	27	27
Kennebec	0	0	1	1	2	2	2	2	2	2	14	14	14
Mid Coast	0	0	0	0	1	1	1	1	1	1	1	1	1
TOTAL	3	3	4	4	20	25	31	31	34	50	72	72	89

Table 6 - Estimated Operating Period Employment by Region

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Aroostook	4	4	4	4	4	4	4	4	4	18	18	18	38
Western	0	0	0	0	18	21	28	28	28	33	35	34	34
Eastern	0	0	0	0	12	21	25	25	32	37	55	55	54
Kennebec	0	0	2	3	5	5	4	4	4	4	34	35	35
Midcoast	0	0	0	0	2	2	2	2	2	1	2	2	2
MAINE	4	4	6	7	41	53	63	63	70	93	144	144	163

Table 7 - Estimated Total Employment Effects of Operating Period Employment by Region

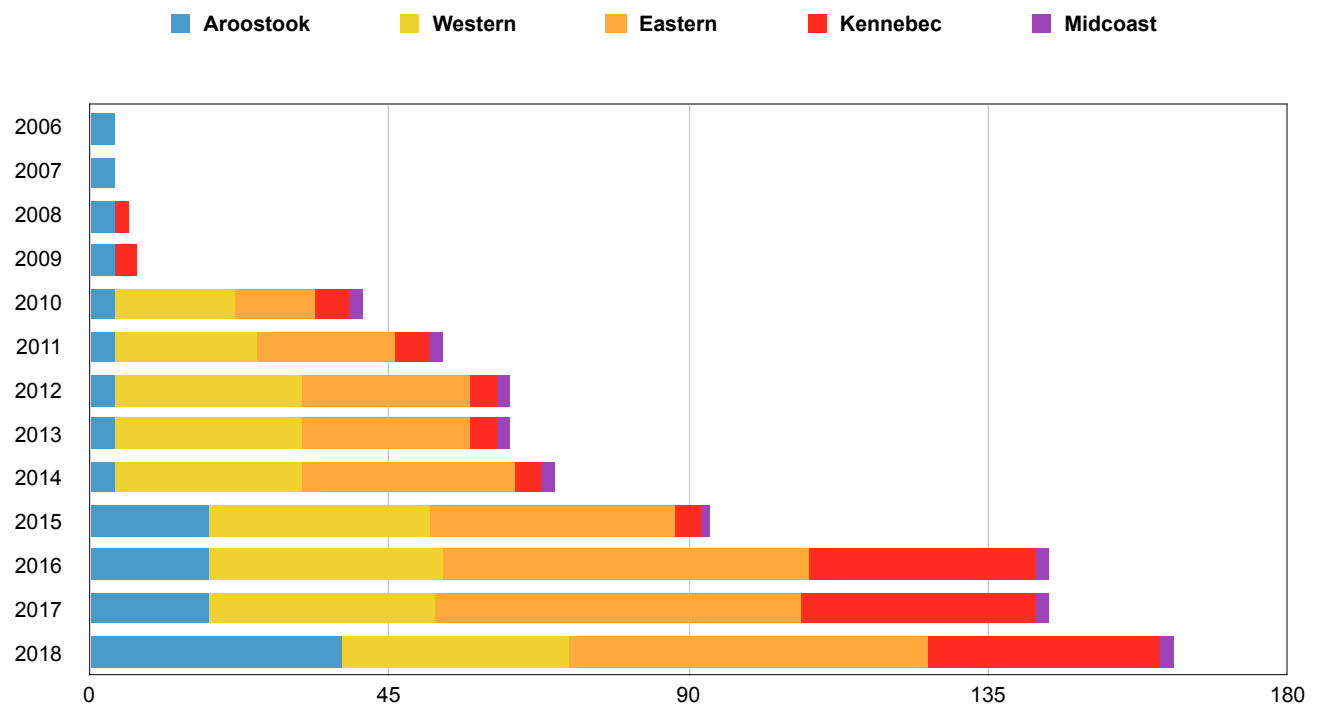


Figure 3 - Estimated Total Employment Effects of Operating Period Employment by Region

The multiplier effect for operating period employment is 1.8 statewide, but varies by region. The smaller economy of Aroostook County means that the multiplier is smallest there at 1.3. The multiplier in the other regions ranges from 2 to 2.4. This indicates that although operating period employment is relatively small, it does have a somewhat larger total employment effect.

The other part of employment during the operating phase occurs when major overhauls of the generation equipment are required, generally every 5-7 years. These maintenance periods require shutting down a turbine, taking it off the tower, conducting the overhaul and repairs, and then reinstalling the turbines. These projects require employment that is similar in scale to phases in the original construction periods.

The exact employment impacts from these operations cannot be estimated as precisely as the construction periods because the timing of these overhauls will vary by company and project. But with over 1300 MW of installed capacity in place after 2018, it is likely that each year will see between 100 and 300 employees engaged on overhaul and major repair operations. With the average construction multiplier of 1.85, this would imply total employment effects of between 185 to 550 employees per year in addition to the operations employment discussed above.

3. Maine Firms Supporting Wind Projects Outside of Maine

A survey of firms conducted by the Maine Ocean & Wind Industry Initiative in 2014 identified sales of \$89.6 million by Maine firms outside of Maine over 2011-2013.

The survey had 68 responses about activities working on wind projects in Maine and elsewhere over 2011-2013. Six to eight firms (depending on the year) reported providing services to international projects, while 17-23 firms reported supporting projects in the U.S. but outside of Maine.

	2011	2012	2013
Cumberland	156	101	83
Western	11	13	6
Eastern	32	11	6
Kennebec Valley	52	96	39
Midcoast	184	351	26
TOTAL	434	571	159

Table 8 - Employment impacts of Maine firms supporting wind projects outside Maine

Firms reported that, on average for these three years, 6% of their wind-related revenues were from international projects and 24% was from projects elsewhere in the U.S. The remaining 70% of these firm's wind-related revenues that came from projects in Maine are assumed to be accounted for in data provided by prime contractors.

	2011	2012	2013
Cumberland	\$11	\$8	\$7
Western	\$1	\$1	\$0
Eastern	\$2	\$1	\$0
Kennebec Valley	\$3	\$6	\$3
Midcoast	\$8	\$9	\$2
Total	\$25	\$25	\$12

Table 9 - Wages and salaries from supporting wind projects outside Maine (in Millions)

Table 8 shows the estimated employment in Maine associated with \$89.6 million in sales outside of Maine. This activity will normally vary by year, and this is demonstrated in these three years with a low of 159 employees in 2013 following a high of 571 employees in 2012. The average additional employment in Maine during these three years was 388 and total earnings increase of \$61.3 million.

As with the estimates of employment from development in state, these estimates from outside Maine activities are very likely conservative. They are derived from a survey with a limited number of respondents and there are likely other companies that had small or one-time involvement outside of Maine and thus would be difficult to include in the sample frame from which the data is derived.

**NUMBER NINE WIND FARM
MDEP NRPA/SITE LOCATION OF DEVELOPMENT COMBINED APPLICATION**

Section 28. Tangible Benefits

EXHIBIT 28-B NUMBER NINE WIND FARM ECONOMIC STUDY

STATE AND LOCAL ECONOMIC IMPACTS OF THE
NUMBER NINE WIND FARM IN AROOSTOOK COUNTY, MAINE

March 2015

Todd Gabe, Ph.D.¹

Commissioned by:
EDP Renewables

STUDY COVER MEMO:

**INDEPENDENT SOURCES USED TO CONDUCT
NUMBER NINE WIND FARM ECONOMIC IMPACT STUDY**

The enclosed study analyzes the economic impacts associated with the Number Nine Wind Farm in Aroostook County, Maine, utilizing data sources that are independent of cost estimates made by the project developer. Specifically, the study is based on independent cost information from a variety of publicly available sources, including the U.S. Department of Energy and Maine Governor's Energy Office.

Because these independent sources are used, it is expected that project-specific estimates will slightly deviate from those contained in this study. These expected variations, however, do not significantly change the study's results and conclusions regarding the economic impacts associated with the Number Nine Wind Farm project.

¹ Todd Gabe (todd.gabe@yahoo.com) is a Professor of Economics at the University of Maine. This study was conducted under a private consulting contract with EDP Renewables.

STATE AND LOCAL ECONOMIC IMPACTS OF THE
NUMBER NINE WIND FARM IN AROOSTOOK COUNTY, MAINE

March 2015

Todd Gabe, Ph.D.²

Commissioned by:
EDP Renewables

This study shows the following:

- ⇒ It will cost an estimated \$613.2 million for the Number Nine Wind Farm to develop and construct a 250 MW facility and 50 mile generator lead line.
- ⇒ Over the three years of project development and construction, the Number Nine Wind Farm will generate a total statewide economic impact—including multiplier effects—of an estimated \$356.4 million in output, an average of 653 full- and part-time jobs, and a three-year total of \$107.8 million in labor income.
- ⇒ The impact of project development and construction on the Aroostook County economy—including multiplier effects—will be an estimated \$114.8 million in output, an average of 324 full- and part-time jobs, and a three-year total of \$39.7 million in labor income.
- ⇒ After the Number Nine Wind Farm is completed, the permanent statewide impact of its annual operations—including multiplier effects—will be an estimated \$4.1 million in output, 29 full- and part-time jobs, and \$1.5 million in labor income.
- ⇒ The permanent impact of the Number Nine Wind Farm's annual operations on the Aroostook County economy—including multiplier effects—will be an estimated \$1.9 million in output, 16 full- and part-time jobs, and almost \$800,000 in labor income.
- ⇒ The economic activity associated with the Number Nine Wind Farm will generate a state and local tax impact of an estimated \$12.6 million over the three years of development and construction, and \$2.6 million annually from its operations.

²

Todd Gabe (todd.gabe@yahoo.com) is a Professor of Economics at the University of Maine. This study was conducted under a private consulting contract with EDP Renewables.

STATE AND LOCAL ECONOMIC IMPACTS OF THE NUMBER NINE WIND FARM IN AROOSTOOK COUNTY, MAINE

1. BACKGROUND AND INTRODUCTION

EDP Renewables is working to develop a 250 MW wind farm, referred to as the Number Nine Wind Farm, near the town of Bridgewater in Aroostook County, Maine. According to its current schedule, development and construction of the wind farm will take place between 2015 and 2017. The project will involve the installation of 119 wind turbines with an aggregate electricity generation capacity of 250 MW, and a 50 mile generator lead line (345kV) to connect the wind farm to the ISO-NE grid.

The purpose of this study is to examine the state and local (i.e., Aroostook County) economic impacts of the proposed Number Nine Wind Farm. Economic impact is defined as the output (i.e., revenue), employment and labor income (e.g., wages and salaries) that are directly related to the project's spending, as well as the multiplier effects supported by the expenditures made in Maine (and Aroostook County) by companies and workers that are associated with the wind farm. Separate economic impact assessments will be conducted for the wind farm's temporary development and construction phase, and its permanent operations. The economic impact analysis is based on data and information from a variety of sources, including the National Renewable Energy Laboratory of the U.S. Department of Energy, and the Maine Governor's Office of Energy Independence and Security.³

A key factor influencing the Number Nine Wind Farm's impact on the state and local economies—in both the development and construction, and permanent operations phases of the

³ The Maine Governor's Office of Energy Independence and Security is now referred to as the Maine Governor's Energy Office.

project—is the amount of spending that is likely to occur in the region. This is determined by the total amounts of spending required for the installation and operations of a 250 MW wind farm and a 50 mile generator lead line, and the percentages of these expenditures that are likely to take place in Maine and Aroostook County.

Table 1 shows the estimated costs of development and construction for a 250 MW wind farm and a 50 mile generator lead line, and its estimated annual operating expenditures. This information is based on cost and expenditure figures from several secondary data sources, including a “Cost of Wind Energy” report published by the U.S. Department of Energy. The total project cost of development and construction is an estimated \$613.2 million. The economic impact analysis is based on a three-year period of development and construction, and expenditures are split evenly across the period (i.e., \$204.4 million per year).⁴

Table 1. Estimated Project Investment and Operating Expenditures

Development and Construction Costs of a 250 MW Facility and 50 Mile Generator Lead Line	\$613,232,600
<hr/>	
Annual Operating Expenses (\$/kW/yr)	\$35
Capacity	250 MW
Estimated Operating Expenditures	\$8,750,000

Notes. Installed capital cost and annual operating expenditure figures are based on information from the *2011 Cost of Wind Energy Review*, published by the National Renewable Energy Laboratory of the U.S. Department of Energy. Generator lead line costs are estimated using information from a 2014 article, “Maine regulators reviewing proposals, including 138-kV, 345-kV lines, to address reliability issues,” in *Transmission Trends* (Issue 4, Volume 4); and a 2012 report *Capital Costs for Transmission and Substations*, prepared for the Western Electricity Coordinating Council by Black & Veatch.

⁴ Actual expenditures will differ in each year of the development and construction phase of the project. This means that the employment and labor income impacts, shown later in the report, will also vary by year; however, the estimated impacts over the entire development and construction phase will be similar to those implied in Tables 2 and 3.

2. ECONOMIC IMPACT ANALYSIS

Table 2 presents information on the temporary statewide economic impacts associated with the development and construction of the 250 MW Number Nine Wind Farm and its 50 mile generator lead line. The direct output of \$79.8 million is interpreted as the estimated amount of project investment (of the \$204.4 million per year) that would take place in Maine (estimated by the Maine IMPLAN model, which is described below). In-state spending of \$79.8 million is equivalent to 39.0 percent of the annual costs of development and construction. This estimated percentage of in-state spending is similar to the share of 36.8 percent for the “Bowers Wind Project,” reported in the 2012 *Maine Wind Energy Development Assessment* prepared by the Maine Governor’s Office of Energy Independence and Security. The direct employment of 343 full- and part-time jobs and \$22.6 million in labor income are the estimated (by the Maine IMPLAN model) labor market activity in Maine that would be supported by the \$79.8 million of spending on the wind farm’s development and construction.⁵

The multiplier effects shown in Table 2 are the additional output (i.e., revenue), employment and labor income (e.g., wages and salaries) in Maine that are supported by the purchases of businesses and workers that are impacted by the Number Nine Wind Farm’s development and construction. The IMPLAN (**IM**portant **AN**alysis for **PL**anning) model, which is used to estimate the multiplier effects, is an input-output framework that traces the flows of expenditures and income through the Maine economy with a complex system of accounts that are uniquely tailored to the region.⁶ Underlying these accounts is information regarding transactions occurring among businesses located in Maine, the spending patterns of households,

⁵ The IMPLAN model is based on an employment headcount, which does not distinguish between full- and part-time workers.

⁶ The IMPLAN model was originally developed for the USDA Forest Service.

and transactions occurring between Maine business and households and the rest of the world. Some of the data sources used to develop the IMPLAN model include County Business Patterns of the U.S. Census Bureau, Regional Economic Information System (REIS) data and input-output accounts from the U.S. Bureau of Economic Analysis, and ES-202 statistics from the U.S. Bureau of Labor Statistics.

Including multiplier effects, the development and construction of the Number Nine Wind Farm (based on a total investment of \$613.2 million) would have an annual economic impact—for the three years of the project—of an estimated \$118.8 million in output, 653 full- and part-time jobs, and \$35.9 million in labor income. These figures indicate that the workers directly and indirectly involved in the facility’s development and construction would earn an average of \$55,035 in labor income per year.

The statewide output multiplier of 1.49, defined as the ratio of total output (\$118.8 million) to direct output (\$79.8 million), suggests that every \$1.00 of spending in Maine on the development and construction of the Number Nine Wind Farm would support a total of \$1.49 in statewide economic activity; that is, the “initial” \$1.00 in spending plus an additional \$0.49 spread across other locations and sectors of the economy. The statewide employment multiplier of 1.90, calculated as the ratio of total (653 jobs) to direct (343 jobs) employment, implies that the economic activity associated with each person directly related to the wind farm’s development and construction would support a total of 1.90 Maine jobs; that is, the person related to the project and an additional 0.90 full- and part-time jobs elsewhere in the state.⁷

⁷

The output and employment multipliers, as estimated by the IMPLAN model, are based on the productivity of labor and the types of industries present in Maine, which determine the amount of purchases that could be made in the state. The multiplier effects could increase in the future if, among other things, the goods

Table 2. Estimated Temporary Statewide Economic Impacts of Project Development and Construction: Years 1 to 3

	Direct Impact	Multiplier Effects	Total Impact
Output	\$79,849,636 per year	\$38,946,165 per year	\$118,795,801 per year
Employment	343	310	653
Labor Income	\$22,636,554 per year	\$13,301,521 per year	\$35,938,075 per year
Output	\$239,548,908 3-year impact	\$116,838,495 3-year impact	\$356,387,403 3-year impact
Employment	343	310	653
Labor Income	\$67,909,662 3-year impact	\$39,904,563 3-year impact	\$107,814,225 3-year impact

Notes: Direct output of \$79.8 million (or \$239.5 million over three years) is interpreted as the estimated amount of project development and construction expenditures that would take place in Maine. The direct output figure is estimated using information from the *2011 Cost of Wind Energy Review*, published by the National Renewable Energy Laboratory of the U.S. Department of Energy, and information from the Maine IMPLAN model. Direct employment and labor income figures, and multiplier effects are estimated by the Maine IMPLAN model. The “3-year impact” figures for output and labor income are the “per year” impacts multiplied by three. The “3-year impacts” for employment are average figures, because some of the development and construction jobs could last over the entire period.

The bottom panel of Table 2 shows the estimated statewide economic impacts of wind farm development and construction for the first three years of the project (i.e., the entire period of its development and construction). The employment impacts are reported as average values, and not three-year totals, because some of the development and construction jobs could last over

and services purchased by companies (that are part of the wind farm’s supply chain) and households were to become more available over time.

the entire development and construction phase. Including multiplier effects, the three-year impacts of project development and construction are an estimated \$356.4 million in output, an average of 653 full- and part-time jobs, and a three-year total of \$107.8 million in labor income.⁸

Table 3 presents information on the temporary county-level economic impacts of the Number Nine Wind Farm's development and construction. The local (i.e., Aroostook County) economic impacts are lower than those estimated for the entire state for a couple of reasons. First, IMPLAN estimates for the percentage of development and construction spending captured by the region are much higher for Maine than Aroostook County. Second, the multipliers are higher for Maine than Aroostook County because the state offers a wider variety of products and services that could be purchased by the wind farm, its suppliers, and their employees.

The direct output of \$27.4 million is the estimated amount of annual development and construction expenditures (of the \$204.4 million per year) that would take place in Aroostook County. This amount, along with the direct employment of 226 full- and part-time jobs and direct labor income of \$9.6 million per year, is estimated by the IMPLAN model for Aroostook County. Including multiplier effects, the three-year impact of the development and construction of the Number Nine Wind Farm on the Aroostook County economy is an estimated \$114.8 million in output, an average of 324 full- and part-time jobs, and a three-year total of \$39.7 million in labor income.

⁸ A 2011 study of three wind farms (with a combined capacity of 257 MW) in Maine found a total employment impact of an estimated 1,965 job-years (spread over an eight year period) (Colgan 2011). The employment impact estimated in this study—i.e., an average of 653 jobs per year—translates into an estimated 1,959 job-years. Thus, the employment impacts estimated in the two studies are practically identical.

Table 3. Estimated Temporary Aroostook County Economic Impacts of Project Development and Construction: Years 1 to 3

	Direct Impact	Multiplier Effects	Total Impact
Output	\$27,359,854 per year	\$10,900,061 per year	\$38,259,915 per year
Employment	226	98	324
Labor Income	\$9,554,587 per year	\$3,672,400 per year	\$13,226,987 per year
Output	\$82,079,562 3-year impact	\$32,700,183 3-year impact	\$114,779,745 3-year impact
Employment	226	98	324
Labor Income	\$28,663,761 3-year impact	\$11,017,200 3-year impact	\$39,680,961 3-year impact

Notes: Direct output of \$27.4 million (or \$82.1 million over three years) is interpreted as the estimated amount of project development and construction expenditures that would take place in Aroostook County. The direct output figure is estimated using information from the *2011 Cost of Wind Energy Review*, published by the National Renewable Energy Laboratory of the U.S. Department of Energy, and information from the Aroostook County IMPLAN model. Direct employment and labor income figures, and multiplier effects are estimated by the Aroostook County IMPLAN model. The “3-year impact” figures for output and labor income are the “per year” impacts multiplied by three. The “3-year impacts” for employment are average figures, because some of the development and construction jobs could last over the entire period.

The county-level output multiplier of 1.40, defined as the ratio of total output (\$38.3 million) to direct output (\$27.4 million), suggests that every \$1.00 of spending in Aroostook County on the development and construction of the Number Nine Wind Farm would support a total of \$1.40 in local economic activity; that is, the “initial” \$1.00 in spending plus an additional \$0.40 spread across the county. The county-level employment multiplier of 1.43, calculated as the ratio of total (324 jobs) to direct (226 jobs) employment, implies that the economic activity associated with each person in Aroostook County directly related to the wind farm’s development and construction would support a total of 1.43 local jobs; that is, the person related to the project and an additional 0.43 full- and part-time jobs elsewhere in the county.

Permanent Impacts of the Number Nine Wind Farm’s Annual Operations

After the three-year development and construction phase of the project is completed, the Number Nine Wind Farm will provide ongoing impacts on the Maine and Aroostook County economies through its permanent operations. As shown in Table 1, the annual operating expenses—based on information from the *2011 Cost of Wind Energy Review* of the U.S. Department of Energy—are an estimated \$8.8 million for a 250 MW facility.

Table 4 shows information on the estimated statewide economic impact of the Number Nine Wind Farm’s permanent operations, starting in “year 4” and continuing into the future. The direct output of \$2.7 million per year is interpreted as the estimated amount of annual operating expenses that would take place in Maine. This amount of in-state spending would support, based on estimates generated by the Maine IMPLAN model, 17 full- and part-time jobs and \$1.0 million in direct labor income. The total annual statewide economic impact of facility operations,

including multiplier effects, is an estimated \$4.1 million in output, 29 full- and part-time jobs, and \$1.5 million in labor income.

Table 4. Estimated Permanent Statewide Economic Impacts of Facility Operations: Years 4 and into the Future

	Direct Impact	Multiplier Effects	Total Impact
Output	\$2,696,011 per year	\$1,383,604 per year	\$4,079,615 per year
Employment	17	12	29
Labor Income	\$1,024,824 per year	\$457,901 per year	\$1,482,725 per year

Notes: Direct output of \$2.7 million per year is interpreted as the estimated amount of operating expenditures that would take place in Maine. The direct output figure is estimated using information from the *2011 Cost of Wind Energy Review*, published by the National Renewable Energy Laboratory of the U.S. Department of Energy, and information from the Maine IMPLAN model. Direct employment and labor income figures, and multiplier effects are estimated by the Maine IMPLAN model.

Table 5 shows information on the estimated annual economic impact of the Number Nine Wind Farm's operations on Aroostook County. The direct output of \$1.4 million is the amount of operating expenses, based on estimates from the IMPLAN model for Aroostook County, that would take place locally. This amount of annual economic activity in the county would generate \$628,227 in labor income, as estimated by the IMPLAN model. The direct employment of 11 full- and part-time jobs is interpreted as the number of people who would work "on-site" to operate and maintain the facility.

Table 5. Estimated Permanent Aroostook County Economic Impacts of Facility Operations: Years 4 and into the Future

	Direct Impact	Multiplier Effects	Total Impact
Output	\$1,387,533 per year	\$518,417 per year	\$1,905,950 per year
Employment	11	5	16
Labor Income	\$628,227 per year	\$166,090 per year	\$794,317 per year

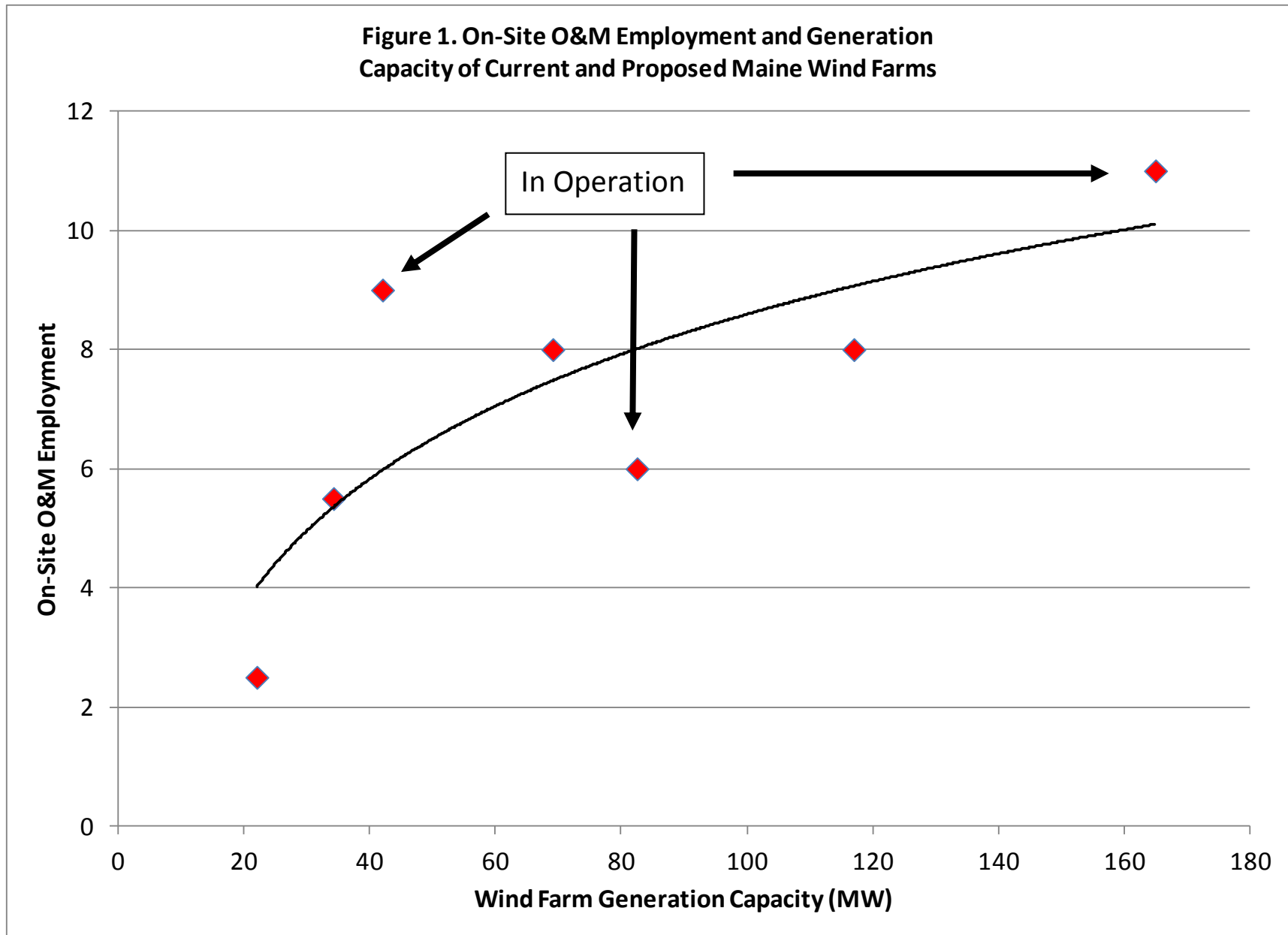
Notes: Direct output of \$1.4 million per year is interpreted as the estimated amount of operating expenditures that would take place in Aroostook County. The direct output figure is estimated using information from the *2011 Cost of Wind Energy Review*, published by the National Renewable Energy Laboratory of the U.S. Department of Energy, and information from the Aroostook County IMPLAN model. The direct employment of 11 jobs is based on other wind power projects in Maine, as shown in Figure 1. The direct labor income figure and multiplier effects are estimated by the Aroostook County IMPLAN model.

The direct employment of 11 workers is estimated using information from other wind power projects that are in operation (or have been proposed) in Maine. Figure 1 is a scatter plot showing the wind farm generation capacity and (actual or projected) on-site employment for seven other projects in Maine.⁹ The trend line is a logarithmic function showing the relationship between on-site employment and the size (i.e., capacity) of the wind farm. Based on these other

⁹ The seven projects considered are: Bowers Mountain, Bull Hill, Canton Mountain, Highland Wind, Kibby I and II, Mars Hill, and Stetson I and II. Employment figures for these projects are from a variety of sources, including the *Maine Wind Energy Development Assessment* report of the Maine Governor's Office of Energy Independence and Security, and a "Wind Powering America Rural Economic Development Case Study" by the National Renewable Energy Laboratory of the U.S. Department of Energy.

seven projects, it is estimated—using the trend line shown in Figure 1—that a 250 MW facility would have 11 on-site employees.

The multiplier effects shown in Table 5 are the additional output, employment and labor income that would be supported in Aroostook County by the direct economic activity of the wind farm’s annual operations. Including multiplier effects, the Number Nine Wind Farm would have an ongoing economic impact on Aroostook County of an estimated \$1.9 million in output, 16 full- and part-time jobs, and \$794,317 in labor income.



3. JOB IMPACTS COMPARED TO ESTIMATES FROM OTHER STUDIES

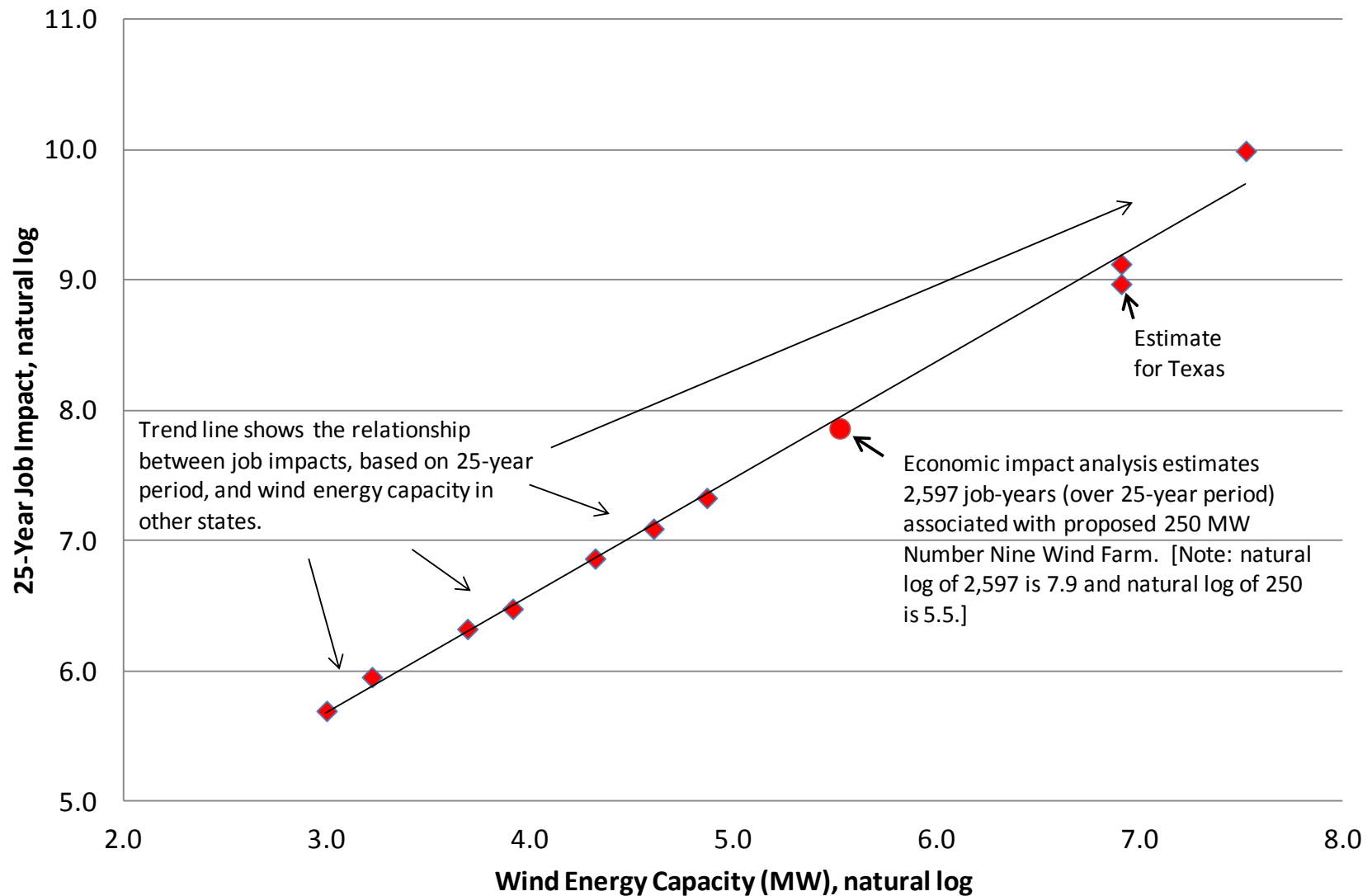
The analysis presented above suggests that the proposed Number Nine Wind Farm would generate a statewide employment impact of an estimated 653 full- and part-time jobs over a three-year period of project development and construction, and support 29 full- and part-time jobs in Maine associated with the wind farm's permanent annual operations. The economic impact assessment shows county-level employment impacts of an estimated 324 full- and part-time jobs during the wind farm's development and construction period, and 16 full- and part-time jobs in Aroostook County related to its ongoing operations. Results of economic impact studies from other states and wind power projects can be used to provide a frame of reference to these figures estimated for Maine and Aroostook County.

Figure 2 shows the estimated job impacts and wind energy capacities for installations of various sizes (e.g., 130 MW in Utah, 1,000 MW in Colorado) in the states of Colorado, Illinois, Texas and Utah.¹⁰ The employment impacts are standardized to a number of “job-years” over a 25-year period, and the employment and wind power capacity figures are transformed into their natural logs.¹¹ For example, 1,000 MW of wind power capacity in Texas would support an estimated 7,860 job-years over a 25-year period—including construction and operations (Reategui and Hendrickson 2011). Noting that the natural log of 1,000 (i.e., the wind power capacity) is 6.9 and the natural log of 7,860 (i.e., number of job-years) is 9.0, the point on the scatter plot representing the 25-year employment impact of 1,000 MW of wind power capacity in Texas is indicated in Figure 2.

¹⁰ The employment impacts and wind energy capacities are based on figures reported by Reategui and Tegen (2008), Ratliff et al. (2009), Loomis and Hinman (2010), Reategui and Hendrickson (2011), and Coover et al. (2013).

¹¹ Loomis and Hinman (2010) use a 25-year period for estimating the impacts of wind power in Illinois.

Figure 2. Number Nine's Statewide Job Impact is Very Close to What Would be Predicted based on Other Studies



The combinations of estimated job impacts and wind power capacities for ten scenarios, including the one for Texas, are shown as the diamond-shaped points in Figure 2. These ten points, which do not include the proposed Number Nine Wind Farm in Maine, are used to determine the trend line. This line, estimated using an ordinary-least squares regression, summarizes the relationship between the state-level employment impacts and capacities of wind power installations. The trend line can be used to predict the employment impact associated with a wind power installation of a given size.

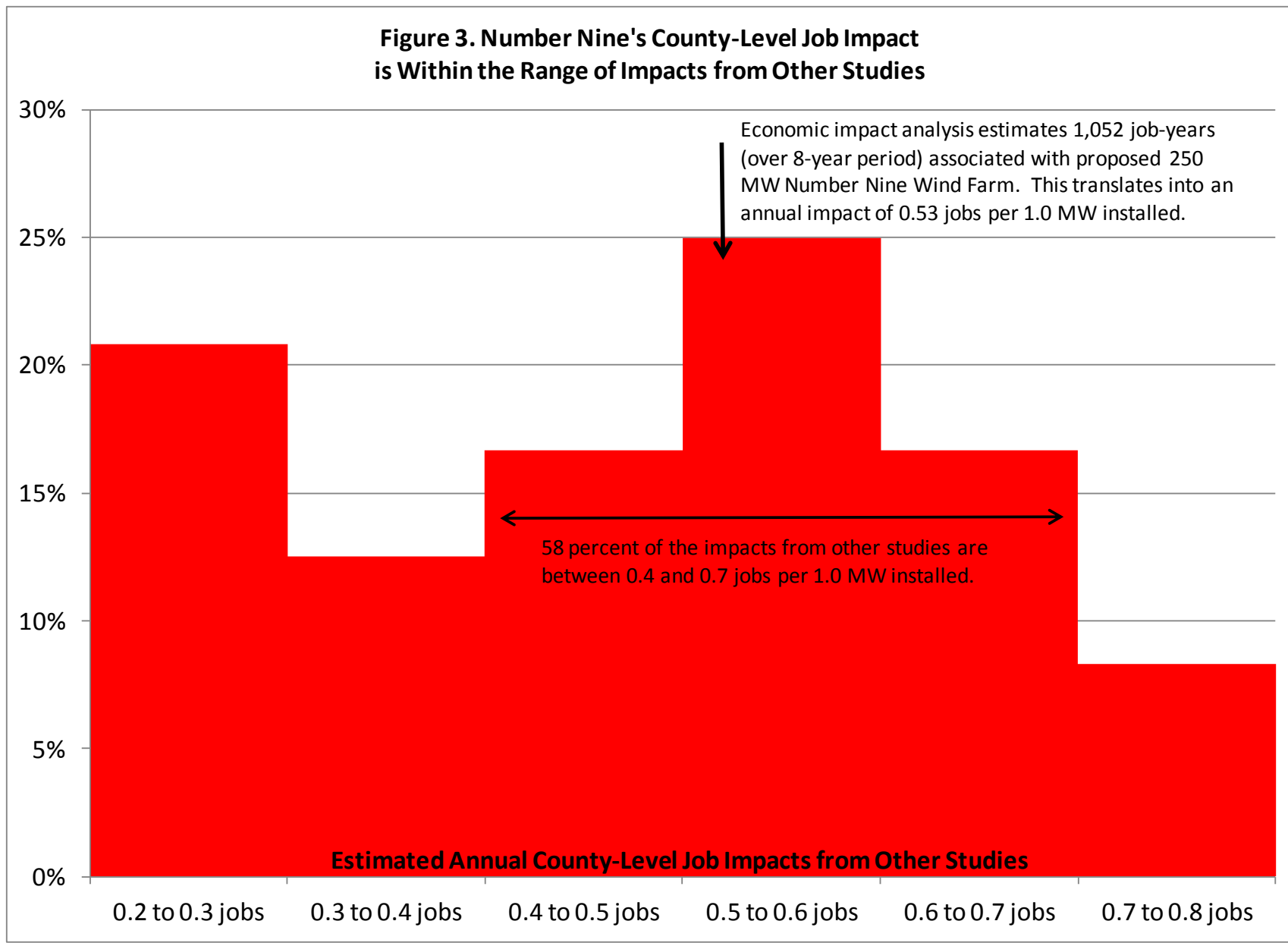
The point in Figure 2 indicated by the circle is the combination of the proposed 250 MW capacity of the Number Nine Wind Farm and the estimated 25-year employment impact of 2,597 job-years (i.e., 3 years of 653 jobs during the project development and construction period, and 29 permanent jobs over the next 22 years of operations). Both of these figures are transformed into their natural logs. A comparison of the point indicating the proposed Number Nine Wind Farm to the trend line, based on the job impacts and capacities of wind power installations in other states, suggests that the 25-year statewide job impact associated with the Number Nine Wind Farm is very similar to what would be predicted based on other studies.

To provide a frame of reference to the job impacts for Aroostook County shown in Tables 3 and 5, Figure 3 is a histogram summarizing the estimated employment impacts of wind energy projects in other counties, outside of Maine.¹² To be consistent with a study by Brown et al. (2012), which examined county-level impacts from 2000 to 2008, the figures are standardized into 8-year impacts (instead of 25-year impacts, as shown in Figure 2). Based on 24 observations of job impacts estimated using information from other counties, we see that 25 percent of the

¹² The employment impacts are based on figures reported by the United States Government Accountability Office (2004), Torgerson et al. (2006) and Brown et al. (2012).

employment impacts are between 0.5 and 0.6 jobs per 1.0 MW of wind energy capacity—and 58 percent of the impacts are between 0.4 to 0.7 jobs per 1.0 MW of capacity.

The downward pointing arrow shown in Figure 3 represents the county-level job impact estimated for the Number Nine Wind Farm. Results of the economic impact analysis show an 8-year employment impact of 1,052 job-years (i.e., 3 years of 324 jobs during the project development and construction period, and 16 jobs over the next 5 years of operations). This impact translates into an estimated 0.53 jobs per year—per 1.0 MW of wind energy capacity—which is well within the range of impacts estimated from other studies.



4. STATE AND LOCAL TAX IMPACTS

The increased economic activity associated with the Number Nine Wind Farm's development and construction, as well as its ongoing operations, will generate additional state and local tax revenue. As shown in the top panel of Table 6, the three-year development and construction phase will have an estimated \$4.2 million annual impact on state and local taxes, or a \$12.6 million impact over the entire period. This state and local tax impact, as estimated by the Maine IMPLAN model, is equivalent to 11.7 percent of the project's impact on labor income (see Table 2).

The state and local tax impact of facility operations was estimated in two parts. The property tax estimate is based on the facility size, amount of capital investment (actual or estimated), and property taxes (actual or estimated) of six other wind power projects that are in operation or have been proposed in Maine.¹³ Based on these figures, the Number Nine Wind Farm would have an annual property tax impact of an estimated \$2.4 million. It should be noted, however, that the actual yearly property tax payments that are made could be subject to any tax incentive agreements negotiated between the developer and host community.

The "other state and local taxes" (i.e., \$150,169) shown in the bottom panel of Table 6 is estimated by the IMPLAN model, although the property tax impact was removed from the IMPLAN tax figure to avoid double counting. The total annual state and local tax impact associated with the ongoing operations of the Number Nine Wind Farm would be an estimated \$2.6 million.

¹³ The six projects considered are: Bowers Mountain, Bull Hill, Highland Wind, Kibby II, Mars Hill, and Vinalhaven. Property tax figures for these projects are from a variety of sources, including the *Maine Wind Energy Development Assessment* report of the Maine Governor's Office of Energy Independence and Security, and a "Wind Powering America Rural Economic Development Case Study" by the National Renewable Energy Laboratory of the U.S. Department of Energy.

Table 6. Summary of State and Local Tax Impacts

Project Development and Construction		S&L Tax Revenue
Per Year		\$4,214,270
3-Year Impact		\$12,642,810
Facility Operations		S&L Tax Revenue
Property Taxes		\$2,417,191
Other State and Local Taxes		\$150,169
Total State and Local Taxes		\$2,567,360

Notes: Project development and construction state and local tax impacts are estimated by the Maine IMPLAN model. The property tax impact of facility operations is based on other wind power projects in Maine. The “other state and local taxes” associated with facility operations are estimated by the Maine IMPLAN model.

5. SUMMARY AND CONCLUSIONS

The purpose of this study was to examine the state and local (i.e., Aroostook County) economic impacts of the proposed Number Nine Wind Farm. This project, which involves a 250 MW wind farm and a 50 mile generator lead line, would impact the economy through its temporary development and construction phase as well as its permanent operations. The development and construction of the wind farm would cost an estimated \$613.2 million, and the ongoing operating expenditures would be an estimated \$8.8 million per year.

Results of the study show that the development and construction of the Number Nine Wind Farm would generate \$79.8 million in direct in-state expenditures per year over the three-

year project, which is equivalent to 39.0 percent of the estimated \$204.4 million in total annual expenditures to complete the facility. Including multiplier effects, the total annual statewide economic impact of this spending would be an estimated \$118.8 million in output, 653 full- and part-time jobs, and \$35.9 million in labor income for three years. Over the entire three-year development and construction phase, the total statewide economic impact—including multiplier effects—would be an estimated \$356.4 million in output, an average of 653 full- and part-time jobs, and a three-year total of \$107.8 million in labor income.

The total three-year impact of the development and construction phase on the Aroostook County economy would be, including multiplier effects, an estimated \$114.8 million in output, an average of 324 full- and part-time jobs, and a three-year total of \$39.7 million in labor income. The impacts on the Aroostook County economy are lower than those determined for the entire state because estimates for the percentages of development and construction spending captured by the region are much higher for Maine than Aroostook County. Likewise, the multiplier effects are higher for Maine than Aroostook County because the state offers a wider variety of products and services that could be purchased by the wind farm, its suppliers, and their employees.

After the wind farm is completed, the facility would generate an ongoing economic impact through its expenditures on operations and maintenance (and the workers that it would directly employ). Including multiplier effects, the ongoing operations of the Number Nine Wind Farm would have a permanent annual statewide economic impact of an estimated \$4.1 million in output, 29 full- and part-time jobs, and \$1.5 million in labor income. The wind farm's operations would have an annual impact on the Aroostook County economy, including multiplier effects, of an estimated \$1.9 million in output, 16 full- and part-time jobs, and \$794,317 in labor income.

The total employment impact of 16 jobs includes an estimated 11 positions available at the wind farm.

In addition to its impact on output, employment and labor income, the economic activity related to the Number Nine Wind Farm would generate additional state and local tax revenue. Based on information from the IMPLAN economic impact model, the wind farm's development and construction phase would have an annual state and local tax impact of an estimated \$4.2 million, or \$12.6 million over the three-year project. The permanent operations of the Number Nine Wind Farm would have an annual state and local tax impact of an estimated \$2.6 million. A large percentage of the wind farm's permanent impact on state and local taxes comes from property taxes, which could differ from the amount estimated if the developer and host community were to negotiate a tax incentive.

6. REFERENCES

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**NUMBER NINE WIND FARM
MDEP NRPA/SITE LOCATION OF DEVELOPMENT COMBINED APPLICATION**

Section 28. Tangible Benefits

**EXHIBIT 28-C RESOLUTION ADOPTED BY AROOSTOOK
COUNTY COMMISSIONERS (JAN. 21, 2015)**

County of Aroostook

COMMISSIONERS' OFFICE

COUNTY ADMINISTRATOR

DOUGLAS F. BEAULIEU



COUNTY COMMISSIONERS

PAUL J. ADAMS
HOULTON

NORMAN L. FOURNIER
WALLAGRASS

PAUL J. UNDERWOOD
PRESQUE ISLE

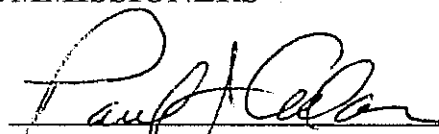
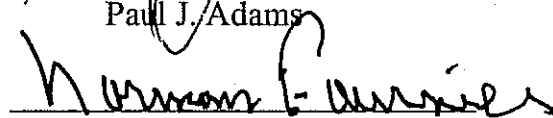
AROOSTOOK COUNTY COMMISSIONERS' RESOLUTION

BE IT RESOLVED, by the Commissioners of Aroostook County, that:

- (1) Aroostook County agrees to accept funds from Number Nine Wind Farm LLC in an amount not less than \$4,000 per turbine per year consistent with 35-A M.R.S. § 3454; and
- (2) While Aroostook County is still negotiating the details of a Community Benefit Agreement with Number Nine Wind Farm LLC, Aroostook County is committed to accepting the tangible benefit funds from Number Nine Wind Farm LLC for the proposed wind energy project.

Dated this 21st day of January, 2015, in Fort Kent, Maine.

AROOSTOOK COUNTY COMMISSIONERS


Paul J. Adams

Norman L. Fournier

(Note: Commissioner Paul J. Underwood has abstained from voting on this Resolution)

**NUMBER NINE WIND FARM
MDEP NRPA/SITE LOCATION OF DEVELOPMENT COMBINED APPLICATION**

Section 28. Tangible Benefits

**EXHIBIT 28-D NUMBER NINE WIND FARM RESIDENTIAL
HEATING IMPROVEMENT PROGRAM FOR AROOSTOOK
COUNTY**

Number Nine Aroostook County Residential Heating Improvement Program

“Program Summary”

Number Nine Wind Farm, LLC (“Number Nine”) is developing a 250 MW wind farm in central Aroostook County. As part of its application to the Maine Department of Environmental Protection, Number Nine is proposing a residential heating improvement program for Aroostook County to further satisfy the tangible benefit standard for utility scale wind energy projects under the Maine Site Location of Development Act. 35-A M.R.S. § 3454. This program is in addition to efforts Number Nine is undertaking with Aroostook County to satisfy the tangible benefits requirement.

The purpose of the Number Nine Aroostook County Efficient and Clean Heat Program (the “Program”) is to help reduce northern Maine’s dependence on heating oil and reduce Aroostook County resident’s heating costs. Currently, approximately 75% of households in Aroostook County use heating oil. The Program will help reduce dependence on heating oil by replacing it with more efficient heating systems and energy efficiency.

The Program will make available a total of \$2,000,000 in financial assistance to residents of Aroostook County. This funding will be available as financial assistance to each residence that meets basic eligibility criteria and that installs programs that meet the objectives of 35-A §10109 subsection 4. In addition to funding by the Program, other incentives may be utilized such as those offered by Efficiency Maine Trust. It is also anticipated the Program will include provisions for additional financial assistance to residents with higher financial needs, similar to the framework of Low Income Energy Assistance Program (“LIHEAP”).

The Program has been developed with the unique needs of Aroostook County fully in mind. Aroostook County is Maine’s largest county and among its most sparsely populated. Aroostook County residents have consistently registered among the highest rate of household receipt of assistance through LIHEAP. In 2008, more Aroostook County households received LIHEAP assistance than any other Maine county. The 2008 LIHEAP program reached more than 6,000 households with more than 12,000 residents, 40 per cent of whom were over 65 years of age. Aroostook County, therefore, is particularly promising region for deployment of the Project. When fully implemented, the Program should significantly reduce heating oil consumption and reduce home heating costs throughout the county.

To develop the most effective method to administer the Program, Number Nine anticipates Aroostook County will be seeking assistance and guidance from the Governor’s Energy Office and Office of Policy and Management, Efficiency Maine Trust, and the Maine Department of Economic and Community Development, as specifically contemplated in 35-A M.R.S. 3454(5). This collaboration will focus on three main aspects:

- (1) The geographic scope of the Program;
- (2) The form of the incentive(s) offered by the Program (e.g., rebate, financing, direct payment, etc.); and
- (3) The household criteria for Program eligibility.

We anticipate that Efficiency Maine Trust in collaboration with Aroostook County will administer the Program when it is fully developed.